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ABSTRACT

Two variables directly related to understanding and improving notetaking practices and instructional strategies were investigated. The first variable investigated was the different levels of pretraining: pretraining vs. no pretraining; and the second was the influence of three types of test mode expectations: multiple choice, essay, or nonspecified test. A 3 x 2 factorial design was employed. One hundred students in grades 11-12 were randomly assigned to one of the six treatments. Pretraining was most beneficial for those expecting a multiple choice test and hindered those expecting an essay test. Those expecting a non specified test attempted to record the most information while both multiple choice and nonspecific test expectations led to more efficient notes (amount of ideas to number of words) than those expecting an essay test. The indication is that different test expectations lead to different study strategies and organizational schemes. (Author/RL)

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THE EFFECTS OF PRETRAINING

AND

TEST MODE EXPECTATIONS ON NOTETAKING

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The Effects of Pretraining and Test Mode Expectations on Notetaking

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This study investigated two variables directly related to understanding and improving notetaking practices and instructional strategies. The first variable investigated was the different levels of pretraining: pretraining vs. no pretraining, and the second was the influence of three types of test mode expectations: multiple choice, essay, or nonspecified test.

Pretraining was most beneficial for those expecting a multiple choice test and hindered those expecting an essay test. Those expecting a non-specified test attempted to record the most information while both multiple choice and nonspecific test expectations led to more efficient notes (amount of ideas to number of words) than those expecting an essay test. The indication is that different test expectations lead to different study strategies and organizational schemes.

THE EFFECTS OF PRETRAINING AND TEST MODE EXPECTATIONS ON NOTETAKING

Evidence from empirical research (Carter & Van Matre, 1975; Peper & Meyer, 1978; Shimmerlik & Nolan, 1976) suggests that under many conditions, recording and reviewing notes is facilitative. Unlike the carefully structure treatments found in many research studies on prose learning, notetaking treatments are typically poorly controlled. Subjects are told to "take notes" or "listen." It seems that the assumption is subjects given notetaking instruction will engage in similar recording activities. However within a heterogeneous group, there is certain to be wide variation in the style and quality of notetaking skills.

Thus, in this study, to ensure that subjects perform in similar ways, one variable investigated was the level of pretraining given to participants. To reduce heterogenity within the notetaking treatment, half of the participants were trained to use a particular system while the other half received no training. Pretraining was also included because a number of studies have found that "better" notes led to better test performance by students (Crawford, 1925; Nye, 1978; Palmatier, 1971). By training students to use a system which allows them to capture the highest level of information with the fewest words, notetaking pretraining should provide subjects with better records. Better records should in turn facilitate better test performance.

The second variable investigated in the present study was test mode expectation. Students may use information about later performance demands to alter the way in which they take notes. For example, it is common knowledge that students put their pencils down when the instructor makes a statement like "you will not have to remember this point." Or when uncertain about what may be required later, students often record as much information as possible. The influence of test expectation on the quality and quantity of notes recorded and on subsequent recall has only recently received attention in the notetaking literature. Several studies (Hakstian, 1971; Kulhavy, Dyer, & Silver, 1975; Weener, 1971) found no difference in total recall or the total number of notes taken between learners expecting a multiple choice test and those anticipating an essay test. However these three studies examined only the total number of notes taken. Rickards and Friedman (1978) investigated the quality as well as the quantity of notes taken and test performance. They found that test mode expectations did not effect the number of notes taken or total test performance. They did find differences in the type of information recorded. Subjects with essay test expectations encoded more superordinate, high level information in their notes while those with multiple choice expectations encoded more low structural information from the passage. Performance expectations do appear to alter recording strategies.

In the present study, a third level of test expectation was added to the two used by Rickards and Friedman. Nonspecific test expectations were added to determine if uncertainty about the type of performance required would affect notetaking activity.

METHOD

Subjects:

Subjects were 100 high school juniors and seniors from a private Catholic high school in Minnesota. While 122 students volunteered for the study, complete data was received for only 100 because of absenteeism.

Experimental design:

The study employed a 3 X 2 factorial design with two between subjects variables. The three levels of the first variable, test mode expectation, were 1) multiple choice test expectations, versus 2) essay test expectations, versus 3) nonspecific test expectations. The two levels of the second variable, level of pretraining, were 1) pretraining versus 2) no pretraining.

Students were randomly assigned to one of the six treatments shown below:

Treatment Conditions

Test Mode Expectations	Level of Pretraining: Pretraining	Level of Pretraining: No Training
Multiple Choice	n = 14	n = 24
Essay	n = 13	n = 19
Unspecified Test	n = 12	n = 18

n = the number of participants with complete data

Purpose

The purpose of this study was to investigate two variables directly related to understanding and improving notetaking practices and instructional strategies. It was hypothesized that providing subjects with pretraining on how to take notes, notetaking would improve and test performance would facilitated. The second variable, test mode expectation was included to test the effects of different test expectations on notetaking quality, efficiency, and quantity and on test performance. Before encoding, students were led to believe that they would receive a multiple choice test, an essay test or a test of a nonspecific nature. Based on Craik and Lockhart's (1972) argument that the way a subject encodes information partially depends on the anticipated form of the test and drawing from research on other generative activities which indicates that a subject's expectations of learning demands (from instructions or objectives for example) has an influence on learning strategies and retention (Duchastel, 1979; Gagne, 1978; Kaplan & Rothkopf, 1974), it was hypothesized that the quality of notes taken would vary depending on test expectation. In other words the notes would reflect differential encoding strategies. It was further hypothesized that the quality of notes taken would vary depending on test expectation. In other words the notes would reflect differential encoding strategies. It was further hypothesized that the differential encoding strategies would be demonstrated in test performance as well. Those receiving the anticipated form of the test would perform better than groups receiving a test contrary to their expectations. This hypothesis was based on the notion that organizing material in anticipation of one kind of test leads to inferior performance on another form of test (Carey & Lockhart, 1973).

Verbal ability test

The wide Range Vocabulary Test (French, Ekstrom & Price, 1963) with 48 items was used as a measure of verbal ability.

Materials

1. Pretraining:

The materials for the pretraining session were adapted from a study skills package on notetaking obtained from the Study Skills Center at the University of Minnesota. Subjects were told to listen to the lecture and record only the most important information in an organized systematic fashion that would be useful later for review purposes.

2. Lecture:

The lecture was a 20 minute description of the "Evolution of the brain." It was a modification of the materials used by Rickards and Friedman (1978).

3. Multiple Choice test:

A multiple choice test consisting of 35 items, each with four distractors was constructed. The Kuder Rickardson Formula 20 yielded a reliability coefficient of .78.

4. Free Recall test:

The free recall test requested that the student write down everything that he/she could remember from the lecture.

5. The packets:

Every student received a manilla envelope containing all the materials necessary for the experiment. Each of the materials was color coded.

Major Dependent Variables

1. Notes scores: Notes scores were the number of information units recorded by the subject. (The information units pertain to the quality of all phrases recorded and recalled that were meaningful and accurate). The information units were a composite of: superordinate items, subordinate items, example and introductory items from the lecture.
2. Multiple Choice test scores: The total score was the number of correct answers on the multiple choice test.
3. Free Recall score: The score on the free recall test was the number of information units recalled by the subject. The score was a composite of superordinate, subordinate, examples and introductory items from the lecture, recalled by the subject. To receive credit, the information had to be correct.

Secondary Dependent Measures

Eleven secondary dependent measures were examined and reported regarding the notes and free recall.

Notes:

1. number of superordinate items recorded
2. number of subordinate items recorded
3. number of examples recorded
4. number of introductory items recorded
5. quantity of notes recorded (number of actual words recorded)
6. presence or absence of an organized format (such as an outline) used for taking notes
7. efficiency ratio - the number of words used to record ideas, the fewer the words to ideas, the more efficent the notes

Free recall

1. number of superordinate items recalled

2. number of subordinate items recalled

3. number of examples recalled

4. number of introductory items recalled

Procedures

1. Pilot tests:

Two pilot tests were conducted, one at a private Catholic girls school and another at a public high school in Minnesota. Classes af approximately 30 students participated in the pilot procedures. All volunteers were 11th and 12th grade college preparatory students.

2. Pretraining:

Half of the subjects were randomly selected to participate in the pretraining session. The session was held in an adjoining room to the main classroom.

Pretraining lasted for 25 minutes during which learning theory and its relationship to notetaking, effective notetaking techniques and methods were discussed and practiced. After the training, discussion was encouraged. The group was requested not to discuss the session with their classmates.

3. Lecture session and multiple choice test:

Each participant received and labeled a manilla envelope, and was told that they were participating in a learning experiment and thanked. The manilla envelope contained the materials necessary for the study.

First a verbal aptitude test was administered for ten minutes. The subjects returned the test to the envelope extracted the lecture materials. After being told to fill in their name and carefully read the directions, the subjects were told this paper was to be used for notetaking on the lecture to be delivered. The

lecture was given and four minutes of free time were permitted after it was over. Then the subjects returned the lecture packet and retrieved the multiple choice packet. They were told to complete the multiple choice test during the remaining 15 minutes of the class. There was no mention of further meetings.

4. Review period and free recall test

Three days later the manilla envelopes were returned to the subjects. They were informed that this was the final day of the experiment. Directions were given to study their notes for ten minutes. When ten minutes were up, the subjects returned their notes to the envelope and took out the packet which described the free recall activity. Eight minutes were provided for free recall.

Scoring Procedures

1. Lecture analysis:

The lecture was analyzed into 116 phrase units, each unit equal to one information unit. There were four types or quality of informational units: 1) Superordinate items: high quality material containing a main idea or high structural information

2) Subordinate items - provides further clarification of the superordinate, an explanation, definition or component of the superordinate

3) Example - an instance or example of a superordinate or subordinate item

4) Introductory - a connecting phrase, empty language, a title introducing a new part of the lecture.

The total of the four items - equaled the total number of information units a person could possibly record. From the lecture a total of the following was possible:

Type of information	Number in lecture
SUPERORDINATE	18
SUBORDINATE	60
EXAMPLE	28
INTRODUCTORY	10
TOTAL:	116

2. Scoring of notes and free recall:

1) Information units -

Each student's notes and free recall were scored for the number of superordinate, subordinate, examples, and introductory items documented. To receive credit, a student's protocol must have contained the designated words or their semantic equivalents from the lecture materials.

After each kind of information unit was rated and scored, first all the information units of each type were added, and then the total number of information units a subject had encoded or recalled were added together.

2) Organizational scheme - each person's notes were analyzed for the presence or absence of an outline, organization or systematic approach to encoding notes.

3) Number of words in the notes and free recall - the quantity of notes and free recall. The number or words in both were counted and recorded.

4) Efficiency ratio - $\frac{\text{the notes score}}{\text{the quantity of the notes}}$

Before analyzing each set of notes and free recall, the name of the subject and the instructions he/she received, were carefully folded over. This was done to eliminate possible bias by the rater.

3. Scoring of the multiple choice test.

The number of correct answers from a possible 35 was recorded. The subject had to clearly designate the correct choice, if two answers were circled, the subject did not receive credit.

Data Analyses

1. Main analyses:

A multivariate analysis of variance with the main dependent variable was run. Univariate tests were performed with all main and secondary variables. Covariance procedures were considered with the individual difference measures.

2. A Chi Square: was performed with the presence or absence of organization in the notes variable.

3. Efficiency ratio: $\frac{\text{notes score}}{\text{quantity of notes}}$

RESULTS

Inter-rater reliability:

For scoring of the notes and recall measures, scores from twenty four protocols, scored by two raters were compared. The reliability computed with Pearson's product moment correlation ranged from .92 to .99 across the thirteen different points used to rate the notes and free recall.

Data analysis

Procedures to determine whether sex and verbal ability should be treated as covariates were conducted. The results showed that these two variables did not differentially effect treatment cells, so they were not entered as covariates. An intercorrelation matrix was conducted with the three main dependent variables. The

correlation was high.

Multivariate analysis of variance was conducted for the three main dependent variables: Multiple choice score, Free Recall score, and Notes score. Univariate analyses of variance were performed for each dependent variable.

Univariate analyses of variance were conducted on each of the secondary dependent variables as well. These included:

Free recall: 1)number of superordinate items
2) number of subordinate items
3) number of examples
4) number of introductory items
5) number of words in free recall

Notes: 1) number of superordinate items
2) number of subordinate items
3) number of examples
4) number of introductory items
5) number of words in notes

Efficiency

Verbal ability

The Wide Range Vocabulary scores did correlate positively with the multiple choice scores ($r = .44$), free recall scores ($r = .29$) and with the notes scores ($r = .35$). Learners who scored higher generally did better on dependent measures.

1. Multivariate Analyses of Variance:

Multivariate analyses of variance tests were significant, showing that the main dependent variables were unequal at different levels of the test mode expectation variable but not at different

levels of the pretraining variable. There were no significant interactions between the two independent variables.

2. Univariate analyses of Variance:

The univariate analysis of variance for each of the three dependent variables was calculated.

Multiple Choice Scores:

Main effects:

There were no significant main effects for either the levels of pretraining or test mode expectation.

Interaction:

A significant interaction between levels of pretraining and test mode occurred. ($F=3.030$, $df=(2,94)$, p .05)

Simple main effects:

A simple main effects test (Kirk, 1968) clarified this interaction. Two main effects for pretraining were found. For subjects receiving pretraining instruction, those who were given multiple choice expectations scored significantly higher than the untrained multiple choice group ($F=5.744$, $df=(1.94)$, p .05). However, the essay expectancy group that did not receive pretraining performed better than the pretrained essay group did on the multiple choice test ($F=5.975$, $df=(1,94)$, p .05).

For test mode, one level of pretraining was significant; no training ($F=3.689$, $df=(1,94)$, p .05) A contrast test was not significant.

Free Recall Scores

Main effects: There were no significant main effects for either variable.

Interaction:

There was a signifcant interaction (F=3.822, df=(2,94, p .05).

Simple main effects:

This was computed for both independent variables. Results showed significant main effects for the pretrained multiple choice expectancy group which performed higher on the free recall test than the untrained multiple choice expectancy group. (F=4.462, df=(1,94), p .05).

Main effects were found for test mode on both pretraining levels, pretraining (F=3.237, df=(1,94), p .05) and no training (F=3.333, df=(1,94), p .05). The other contrasts were not significant.

Notes Scores

Main effects:

No significant main effects for the level of pretraining emerged, but significant effects were found for test mode expectancy. (F=3.074, df=(2,94), p .05).

Contrasts were conducted on test mode expectations, and the Oneway was not significant so further computations were not done.

Interaction:

There were no significant interactions.

Secondary Dependent Variables

Cell means and Standard Deviations were calculated.

Univariate analyses were conducted on each of the secondary dependent variables.

Free Recall:

1) number of superordinate items in free recall

Main effects: There were none for either variable.

Interactions: Asignificant interaction was found ($F=3.026$, $df=(2,94)$, $p < .05$).

Simple main effects were computed and the level of pretraining variable was found to be significant only for multiple choice expectations ($F=5.5547$, $df=(1,94)$, $p < .05$). Pretrained groups performed better than the untrained groups.

Test mode was not significant for pretraining.

2) number of subordinate items in free recall

Main effects: No main effects were found.

Interactions: No interactions were found.

3) number of examples in free recall

Main effects: There was significant effect for level of pretraining ($F=5.618$, $df=(1,94)$, $p < .05$). The no training group recalled significantly more examples than the pretraining group. There were no main effects for test mode expectations.

Interactions: There were no significant interactions.

4) number of introductory items in free recall

Main effects: There were significant main effects for the level of pretraining ($F=6.8$, $df=1$, $p < .05$). The pretraining group recalled significantly more introductory items than the untrained groups. There were no main effects for test mode expectation.

Interactions: There were no interactions.

Notes

1) number of superordinate items in the notes

Main effects: There were no main effects.

Interactions: There were no significant interactions.

2) number of subordinate items in the notes

Main effects: There were no main effects.

Interactions: There were no significant interactions.

3) number of examples in the notes

Main effects: There was a significant main effect for the levels of pretraining ($F=5.034$, $df=(1,94)$, p .05). The no training group recorded significantly more examples in their notes than the pretraining group. There were no effects for test mode expectations.

Interactions: There were no interactions.

4) number of introductory items in the notes

Main effects: A significant main effect emerged for levels of levels of pretraining ($F=9.991$, $df=(1,94)$, p .05). The pretraining group took more introductory kinds of notes than the no training group.

Interactions: There were no significant interactions.

Number of words in the notes

The cell means and standard deviations were calculated.

A univariate analysis of variance was conducted. Main effects: There were no significant main effects for levels of pretraining or test mode expectation. Interactions: There were no interactions.

Number of words in free recall

A univaraite analysis of variance was conducted. Main effects: There were no significant main effects for levels of pretraining or test mode expectations. Interactions: There were no interactions.

Efficiency

The cell means and standard deviations were calculated.

A univariate analysis of variance test was conducted as a further investigation of note quality. The efficiency formula is:

$$\frac{\text{notes scores}}{\text{number of words in the notes}}$$

Main effects: There were no significant main effects for levels of pretraining. A main effect was found for test mode expectation ($F=4.849$, $df=(2,94)$, p .05).

Contrast tests were conducted. Those encoding notes anticipating a multiple choice test took significantly more efficient notes than expectations of an essay test ($T=3.239$, $df=94$, p .05).

The other contrast was not significant.

Use of Outlines

A Chi Square was performed on the dependent variable examining the presence or absence of an outline used while taking notes. The results for the levels of pretraining were significant ($F=5.23^{1}$, $df=(1)$, p .05). Those subjects who had received pretraining used outlines significantly more while taking notes than the group that had not received training.

Test mode expectations were not significant.

CONCLUSIONS AND RECOMMENDATIONS

Contrary to expectation, individuals who received pretraining did not perform better, instead pretraining led to more organized notes and an emphasis on different kinds of information. Research in general that has pretrained subjects to take notes has not resulted in differential gains in performance (Palmatier, 1971; Robin, Fox, Martell & Archable, 1978). This result is confusing because pretraining in many other learning strategies has been found to be very powerful (Tennyson & Tennyson, 1977; Staley & Wolf, 1979).

In this study, the effects of pretraining were qualified by the type of test expected. The pretrained group with multiple choice expectations performed better on both test measures compared to the untrained group with multiple choice expectations yet the untrained essay group received better scores on the free recall test than the pretrained essay expectation group. Evidently the advocated pretraining strategies benefited multiple choice encoding and recall and hindered essay performance. This could be an indication that typical methods used for teaching notetaking should be examined and researched.

It appears that different kinds of information about how one would be tested influenced a subject's performance. Those receiving nonspecific test expectations attempted to record more information. Perhaps the uncertainty of how to prepare for the test led to more activity. However the additional information units recorded were not significant and did not affect test performance.

The results of this study agree with those of previous experiments (Hakstian, 1971; Weener, 1971; Rickards & Friedman, 1978) in finding no effect for notes encoded in anticipation of a test benefiting or hindering performance on the anticipated test versus on an unanticipated test. Despite the student's attempt to encode for a specific task, the notetaking process and delayed review may act to encode and cue material on many different levels and contexts, so that many retrieval processes are activated and reorganization of materials occurs.

Number of words in notes

The results of the present study confirm those of previous experiments (Hakstian, 1971; Weener, 1971; Rickards & Friedman, 1978) in finding no effect for test mode expectancy on the number of words recorded in notes.

Relationship between notes and recall

The findings of this study support that there is a relationship between good notes and good recall. Other researchers as well uphold this finding (Fisher & Harris, 1973, 1974; Howe, 1970; Aiken, et. al.; Crawford, 1925; Palmatier, 1971).

Quality of Notes

Contrary to the findings of Rickards and Friedman (1978) no differences were found regarding the quality of information units recorded. They reported that essay expectations led to recording more superordinate high level information units in the notes while multiple choice expectations led to more low structural information units in the notes.

In the Rickards & Friedman study subjects read prose material while in the present study subjects listened to a lecture. Perhaps the difference in delivery systems could have effected the quality and efficiency of encoded notes. Since the materials used in this study were a modified version of the materials used in the Rickards & Friedman study, the content matter was not a factor.

Efficiency of Notes

This study found that the efficiency of notes was a function of test expectation. Multiple choice and nonspecific test expectations led to more efficient notetaking than did essay test expectations. Perhaps the essay expectation subjects believed that taking efficient notes was not important for essay test performance.

The efficiency variable merits further investigation. It may provide more insight as to the poorer performance of the pretrained essay group on the free recall measure in contrast to the pretrained multiple choice expectation group. The poor performance of the essay expectation group on the free recall measure may have been a combination of low efficiency and the effects of pretraining. It is possible that efficiency may be a component of useful notes and a predictor of student behavior on tests after the review of notes is permitted, because it appears that those students with more efficient notes perform better.

RECOMMENDATIONS

The study indicates that an individual's student behavior and performance are modified by test mode expectations and pretraining. However to further illuminate thses processes, more investigation is necessary. For a problem with this study lies in the wide variation of individual notetaking strategies in each group. This possibility has also been proposed by other researchers (Hartley & Davies, 1978) who suggest that there may not be an identifiable, unitary notetaking method which can be easily manipulated. For example, Hartley & Truman (1978) examined notes over a series of lectures and reported finding marked variations across lecture series. Therefore, the effects of pretraining and test mode expectations may need to be looked at over a period of time in order to find reliable results.

Much research has been conducted on separating recognition and recall from comprehension (Summers, et. al., 1978), therefore evidence from notetaking of a distinction between encoding strategies for recall versus recognition tasks is important. It appears from this study that efficiency is a function of test expectation and that notetaking pretraining facilitates the performance of students with multiple choice expectations. Perhaps a different kind of pretraining should be administered to students preparing for an essay test in order to improve test performance.

New notetaking training strategies need to be investigated along with the effects of different delivery systems on note-

taking strategies and performance. However the effects of wide variation in individual notetaking methods on performance needs to be addressed. Thus further notetaking studies which examine notes as a way to look at individual differences in coding processes are also justified. Hopefully, they will inform us about how to improve notetaking practices and instructional strategies.

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Handout

THE EFFECTS OF PRETRAINING AND TEST MODE EXPECTATIONS ON NOTETAKING

Treatment Conditions

Level of Pretraining

Test Mode Expectations	Pretraining (PT)	No Pretraining (NT)
Multiple Choice Test (MC)	MCPT n = 14	MCNT n = 24
Essay test (E)	EPT n = 13	ENT n = 19
Non-specified Test (T)	TPT n = 12	TNT n = 18

Dependent Variables: Notes Scores, Multiple Choice Scores, Free Recall Scores

Hypotheses

1. Notetaking training results in notes that are more efficient, and contain a greater number of ideas and improved test performance.
2. Test mode expectations results in differences in the type of information recorded, note efficiency and the number of ideas encoded.
3. Receiving the anticipated form of the test results in better performance on that test than receiving a test contrary to expectations.

Results

1. Hypothesis #1: There were no differences between pretraining and no training on notes and test performance.
2. Hypothesis #2: Test mode expectations did not result in different types of information recorded. It did effect efficiency and and the number of ideas encoded.
   Efficiency: MC > Essay ($p < .05$)
   T > Essay
   # of ideas encoded: T > MC > Essay ($p < .08$)
3. Hypothesis #3: There were no differences in test performance due to expectations.

Other Results

1. The pretrained group used outlines significantly more while taking notes.
2. Interactions: ($p < .05$) Multiple Choice Scores: MCPT > MCNT
   ENT > EPT
   Free Recall Scores: MCPT > MCNT
   MCPT > EPT

Conclusions: Test mode expectation had a far greater effect on the notes than did pretraining.

AERA Convention, April 1980
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